SEMESTER EXAMINATION, DECEMBER-2024

Course Name: - B.tech — Semester:- 3rd

Paper Name: - Data Structures and Algorithm — PaperCode:-TCS-303

Time - 3 Hrs + 20 minutes per hour extra time for V.I. & examinees with writer. Max Marks-70

समय–3 घण्टे+ 20 मिनटप्रति घंटेअतिरिक्त–दृष्टिबाधित एवंसहलेखकपरीक्षार्थियों के लिए। अधिकतम अंक–70

Instructions:

- The question paper consists of three sections namely A, B, C. All sections are compulsory.
- Section A- Each question carries **3 mark. All questions are compulsory.**
- Section B- Answer any **5 out of 7** given questions in maximum one hundred fifty (150) words. Each question carries **7 marks.**
- SectionC- Answer any **2 out of 3** given questions in maximum three hundred (300) words. Each question carries **10 marks.**

निर्देश:

- प्रश्नपत्र में तीन खण्ड अ, ब, व स हैं। सभी खण्ड अनिवार्य हैं।
- खण्ड–अ में प्रत्येक प्रश्न तीन अंक का है। **सभी प्रश्न अनिवार्य हैं।**
- खण्ड–ब में सात प्रश्नों में से **किन्हीं पाँच** प्रश्नों के उत्तर अधिकतम 150 शब्दों में दें। प्रत्येक प्रश्न सात **अंक** का है।
- खण्ड–स में तीन प्रश्नों में से **किन्हीं दो** प्रश्नों के उत्तर अधिकतम (250-300) शब्दों मेंदें। प्रत्येक प्रश्न **10अंक** का है।

Section – A (खण्ड–अ)

Objective Questions (वस्तुनिष्ठप्रश्न)

1. Answer allthe following questions. 5x3 =15

निम्नलिखित सभी प्रश्न अनिवार्य हैं।

i) Which of the following is a characteristic of an efficient algorithm?
   a) Uses mimimal memory
   b) easy to implement
   c) Uses minimal CPU time
   d) All of the above

ii) What is the value of the postfix expression 6 3 2 4 + - * ?
   a) 74
   b) -18
   c) 22
   d) 80

iii) What are the disadvantages of normal binary tree traversals?
   a) There are many pointers which are null and thus useless
   b) There is no traversal which is efficient
   c) Complexity in implementing
   d) Improper traversals

iv) Which is the most appropriate infix expression of this expression AB-DE+F*/?
   a) (A-B)/((D+E*F))
   b) (A-B)/((D*E+F))
   c) (A-B)*((D+E/F))
   d) None of the above

v) Which Big O notation represents constant time complexity?
   a. O(1)
   b. O(n)
   c. O(logn)
   d. O(nlogn)

Section – B (खण्ड–ब)

Short Answer Questions (लघुउत्तरीय प्रश्न)

2. Answer any five of the following questions in maximum150 words. **5x7=35**

निम्नलिखितमें से किन्हींपाँचप्रश्नों के उत्तर अधिकतम 150 शब्दोंमेंदें।

I. Explain Selection Sort algorithm with the help of example 24,9,29,14,19,27.s

II. Explain binary search tree in detail with the help this example :insert following in order an empty BST

40,60,50,33,55,11.

III. Write the algorithm for binary search also write the difference between linear search and binary search.

IV. Construct a B tree 7,15,3,16,5,1,18,9,35,28,39,17,14,20,22,25,27 having degree (order) 5.

V. Explain Asymptotic notation and its types in detail and find the Big-oh notation for this function: $F(n)=3n^2+2n+1$

VI. Define Graph ,its basic terminologies and also explain its types with the help of example.

VII. Write the algorithm for linked reprentation of stack and convert the prefix expression into postfix expression : +a/*bc-de

Section -C

Descriptive Questions (विवरणात्मकप्रश्न)

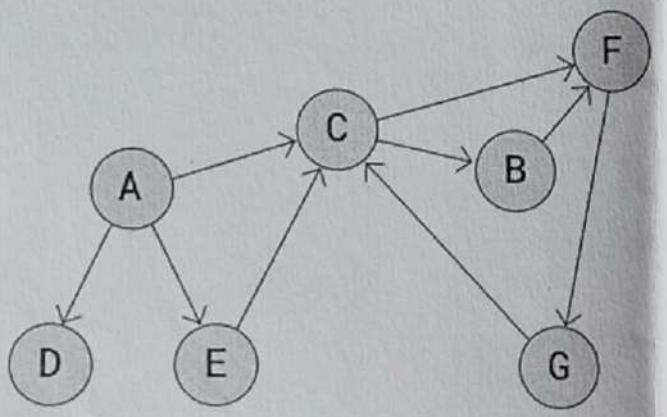
3. Answer any two of the following question in maximum 300 words. **2x10=20**

निम्नलिखितमें से किन्ही दो प्रश्नों के उत्तर अधिकतम 300 शब्दों मे दें।

i) Explain AVL tree in detail and also construct a AVL tree :3,5,11,8,4,1,12,7,2 and 6.

ii) Write the algorithm for Heap sort and perform heap sort on given elements: 5,2,4,7,1,3,2 and 6.

iii) Find out the BFS and DFS traversal for this graph in detail .



Section-D

Course Name: -B.Tech CSE **Semester: - V**

Paper Name: - Data Structures and Algorithm Paper Code: - TCS-303

Time: 30 min

4. **Answer all the following questions.** 10x2=20
निम्नलिखित सभी प्रश्न अनिवार्य हैं।

(i) What is the disadvantage of a linked list?
a. Dynamic size
b. Ease of insertion/deletion
c. Random access is not allowed
d. None of the above

(ii) Circular Queue is also known as---
a. Square Buffer
b. Ring Buffer
c. Curve Buffer
d. Rectangle Buffer

(iii) Which of the following cannot be implemented efficiently using linked list?
a. Queue
b. Priority Queue
c. Stack
d. Binary Search

(iv) Study the following program:

```
#include <stdio.h>
  int main()
{
int arr[6]={8,9,7,5,2,1};
printf("%d'',arr[6]);

    return 0;
   }
```

a.50
b. Garbage value
c. 10
d. None of the these

(v) The time complexity of enqueue operation in Queue is—

a. O(1)
b. O(n)
c. O(logn)
d. O(nlogn)

(vi) A normal queue, if implemented using an array of size MAX_SIZE,gets full when?

a. Rear=MAX_SIZE-1
b. Front=(rear+1)mod MAX_SIZE
c. Front=rear+1
d. Rear=front

(vii) Which sort is not stable sorting?

a. Quick sort
b. Merge sort
c. Bubble Sort
d. Insertion Sort

(viii) The Space complexity in worst case of Merge Sort:

a. O(n)
b. $O(n^2)$
c. O(logn)
d. O(nlogn)

(ix) What is the time complexity to count the number of elements in the linked list?

a. O(n)
b. $O(n^2)$
c. O(logn)
d. O(1)

(x) In a Singly Linked list, what does the last node's next pointer point to ?

a. The first node
b. The second last node
c. Null
d. Itself

.....